CHAPTER 7

CLINICAL LABORATORY

In this chapter we will discuss the classification of bacteria, some of the more common pathogens, and the preparation, staining, and examination of specimens. Also included are basic serologic tests, such as the rapid plasma reagin (RPR) card test for syphilis and the Monosticon slide test for infectious mononucleosis, the potassium hydroxide (KOH) preparation for the identification of fungi, and the principles and procedures for blood grouping and typing.

BACTERIOLOGY

Bacteriology is the study of bacteria. Of primary interest to hospital corpsmen is medical bacteriology, which deals with the bacteria that cause disease in man.

Bacteria are prokaryotic microorganisms of the kingdom Protista. They reproduce asexually by transverse binary fission in which the cell divides into two new cells. They are found almost everywhere, with the human body harboring vast numbers. Many bacteria are beneficial and essential to human life, only a few are harmful to man.

Since there are thousands of different bacteria, a method of classification is essential. Bacteria are classified according to their (1) disease-producing ability, (2) growth requirements, (3) morphologic characteristics, (4) colonial morphology, (5) biochemical activity, (6) toxins, and (7) Gram's stain reaction.

The disease producing ability is termed as either pathogenic or nonpathogenic. Pathogens are bacteria that cause diseases and nonpathogens are the harmless bacteria. Many bacteria that are essential to our body are called common or normal flora in their proper environment. For example, alpha streptococcus in the throat is common flora, but when it is found elsewhere, such as in the blood stream, possibly as a result of tooth extraction, it may cause septicemia and endocarditis.

The four growth requirements are (1) temperature, (2) oxygen, (3) nutrition, and (4) moisture. Temperature requirements are divided into three categories.

- Psychrophilic—those that reproduce best at 15°to 20°C
- Mesophilic—those that reproduce best at 20° to 45°C
- Thermophilic—those that reproduce best at 50° to 55°C

The oxygen requirements vary according to the amount of oxygen needed for an organism to grow or reproduce. Aerobes are those organisms that reproduce in the presence of oxygen. Obligate aerobes are those that grow only in the presence of free oxygen. Anaerobes are organisms that do not reproduce in the presence of oxygen, and obligate anaerobes are those that grow only in the absence of free oxygen and are killed if exposed to free oxygen. Facultative organisms are those that grow both in the presence of free oxygen and in an oxygen-free atmosphere. Microaerophilic organisms are those that grow only in reduced amounts of free oxygen.

Nutritionally, different bacteria require different foods that their particular environment must provide. Autotrophic bacteria are self-nourishing and heterotrophic bacteria are not self-sustaining. Moisture is indispensable for bacterial growth.

Morphologic characteristics are based on three distinct shapes or categories:

- Coccus (pl. cocci)—spherical, appearing singly, in pairs, chains, clusters, or packets.
- Bacillus (pl. bacilli)—rod-shaped, appearing singly, in chains, or in palisades.
- Spirillum (pl. spirilla)—spiral-shaped, corkscrew-shaped, or comma-shaped, appearing singly only.

A colony is a cohesive mass composed of many millions of bacterial cells, growing on or in a medium, such as blood agar, as a result of the multiplication and division of a single cell. The size, color, shape, edge, topography, consistency, and odor of the colony vary with each organism.

Three special structures assist in the classification of bacteria. The capsule is a gummy, gelatinous, or mucoid structure surrounding certain bacteria. The spore is an inactive, resting, and resistant form produced within the organism, usually as a result of unfavorable environmental conditions. The third and final special structure is the flagellum, which is a hairlike structure that provides motility.

Toxins generally are waste products of metabolism in a bacterial cell. Some bacteria produce toxins that attack red blood cells in a medium such as blood agar.

- Alpha hemolysin—produces partial hemolysis and changes the medium to a green color.

- Beta hemolysin—completely lyses the RBC, leaving a clear zone of hemolysis.

- Endotoxin (low potency)—comprises part of the cell wall and is released by autolysis of the bacterial cell.

- Exotoxin (high potency)—is a soluble protein poison that is secreted by the living cell.

Gram's stain reactions can either be positive or negative. Gram-positive reactions will stain dark blue-black. Gram-negative reactions will stain deep pink or reddish.

COMMON BACTERIA

Bacteria are named by genus and species. The first word (capitalized) indicates the genus; the second word (not capitalized) indicates the species, which is a subdivision of the genus.

EXAMPLE:	GENUS	SPECIES
	Neisseria	gonorrhoeae

Cocci

Gram-positive cocci (stain dark blue with Gram's stain)

1. Streptococcus pneumoniae—causes pneumonia
2. Streptococcus pyogenes (Beta Streptococci Group A)—causes strep throat
3. Staphylococcus aureu—most common cause of boils and furuncles as well as osteomyelitis, pneumonia, septicemia, endocarditis, and impetigo

Gram-negative cocci (stain dark pink with Gram's stain)

1. Neisseria gonorrhoeae (gonococcus)—causes gonorrhea
2. Neisseria meningitidis (meningococcus)—causes meningitis

Bacilli

Gram-positive bacilli

1. Corynebacterium diphtheriae—causes diphtheria
2. Ciostridium (all are anaerobic and spore formers)
   a. C. perfringens (welchii)—causes gas gangrene
   b. C. septicum—causes gas gangrene
   c. C. tetani—causes tetanus or lockjaw
   d. C. botulinum—causes food poisoning (botulism)

Gram-negative bacilli

1. Yersinia (Pasteurella) pestis—causes bubonic or pneumonic plague
2. Brucella abortus—causes undulant fever (brucellosis)
3. Bordetella pertussis—causes whooping cough

Intestinal (Enteric) Gram-Negative Bacilli

Salmonella

1. S. typhi—causes typhoid fever
2. S. paratyphi A & B—causes paratyphoid fever
3. S. newport (S. enteritidis)—causes gastroenteritis

Shigella—all of these cause bacillary dysentery (shigellosis).

1. S. dysenteriae (group A)
2. S. flexneri (group B)
3. S. boydii (group C)
4. S. sonnei (group D)

Vibrio cholerae (comma)—causes cholera

Escherichia coli—normally a nonpathogenic organism in the intestine, but if it gets into the abdominal cavity it can cause peritonitis. E. coli has also been known to cause urinary tract infections and diarrhea.

BACTERIOLOGIC METHODS

SMEARS

A smear can be made of almost all body discharges, lesions, or sediments obtained by centrifugation of spinal fluid.

Preparation of Smear

1. Smear specimen on a glass slide previously cleaned with alcohol or acetone and polished with lens paper. A thin and evenly spread smear is preferred for easier reading of the smear and identification of various organisms. Emulsify specimen with saline if thick.
2. Label the smear and circle material to be stained with a diamond point pen for easier identification and location of the material after staining.
3. Let the smear air dry. Forced heat drying will distort bacterial cells and other materials.
4. Fix the smear by passing it through a flame (smear side up) 3 to 4 times. DO NOT BURN SMEAR.
5. Let slide cool and then stain.

GRAM'S STAIN

The most common and useful staining procedure used in bacteriologic work is that of Gram. It is most likely to yield valuable information and should be done in all cases when staining is indicated. It is also used for the examination of cultures to determine purity and for purposes of identification.

Hucker's Modification of Gram's Stain Solution

1. Crystal violet/ammonium oxzlate solution (primary stain):

Yeast contamination is common and the stain must be filtered before use. Use only certified crystal violet. Gentian violet and methyl violet are not recommended because they contain impurities.

Solution A:

Crystal violet (certified)	2 gm
Ethyl alcohol (95 percent)	20 ml

Solution B:

Ammonium oxzlate	0.8 gm
Distilled water	80 ml

Mix solutions A and B, store for 24 hours, filter, and store at room temperature, in a dark bottle, in a dark place, away from direct sunlight.

2. Iodine solution (mordant):

Iodine crystals (USP)	1 gm
Potassium iodide	2 gm
Distilled water	300 ml

Grind iodine and potassium iodide in mortar. Dissolve potassium iodide in a flask in as small amount of water as possible. Add iodine crystals to potassium iodide solution. When dissolution is completed, add remainder of distilled water. Mix and let stand at room temperature for 24 hours. Filter and store in a dark bottle, away from direct sunlight.

3. Decolorizer

Acetone	1 volume
Ethyl alcohol (95 percent)	1 volume

Mix 1 volume of acetone with 1 volume of ethyl alcohol and store in a tightly sealed bottle.

4. Safranine O counterstain:

Safranine O	0.25 g
Ethyl alcohol (95 percent)	10 ml
Distilled water	90 ml

Dissolve dye in ethyl alcohol, then add distilled water to dye solution and let stand at room temperature for 24 hours. Filter and store away from direct sunlight.

Procedure for Gram's Staining

After the smear has been dried, heat-fixed, and cooled off, proceed as follows:

1. Place slide on staining rack and cover specimen with crystal violet. Let stand for 1 minute.
2. Wash briefly in tap water and shake off excess.
3. Cover specimen with iodine solution and let stand for 1 minute.
4. Wash with water and shake off excess.
5. Tilt slide at 45° angle and decolonize with the acetone-alcohol solution until the purple color stops running. Wash immediately with water and shake off excess.
6. Cover specimen with safranine and let stand for 30 seconds to 1 minute.
7. Wash with water, shake off excess, and gently blot dry. The smear is now ready to be read. (Use oil immersion lens.)

Principle of Gram's Stain

The crystal violet stain is the primary stain, which stains everything in the smear blue. The Gram's iodine acts as a mordant that causes the crystal violet to penetrate and adhere to the gram-positive organisms. The acetone-alcohol mixture acts as the decolorizer that washes the stain away from everything in the smear except the gram-positive organisms. The safranine is the counter-stain that stains everything in the smear that has been decolorized: pus cells, mucus, gram-negative organisms. The gram-negative organisms will stain a much deeper pink than the pus cells, and mucus will stain even lighter pink than the pus cells.

READING AND REPORTING SMEARS

Place a drop of oil in the slide and, using the oil immersion objective of the microscope, read the smear. All body discharges contain extraneous materials, such as pus cells and mucus. Of interest, however, are the types of bacteria that may be present. The stained smear reveals only two things: the morphology and the staining characteristics of the bacteria present. Positive identification requires cultures and further studies.

The hospital corpsman reports only what he or she sees.

Example: "Smear shows numerous gram-negative bacilli." If two or more types of bacteria are seen in a smear, the rule is to report them in order of predominance, for example:

1. Numerous gram-positive cocci in clusters
2. Few gram-negative bacilli

Gram-positive organisms are easy to see because they stain a deep blue or blue-black. Gram-negative organisms stain a deep pink, but since the background material is also pink, minute and detailed inspection is necessary before reporting the results.

In the presence of gonorrhea the smear will reveal large numbers of pus cells with varying numbers of intracellular and extracellular gram-negative, bean-shaped cocci in pairs. Such a finding can be considered diagnostic. It is important to point out that only a few of the thousands of pus cells on the slide may contain bacteria and sometimes it requires considerable search to find one.

SEROLOGY

Serology consists of procedures by which antigens and reacting serum globulin antibodies may be measured qualitatively and quantitatively. Serologic tests have been devised to detect either antigens present or antibodies produced in a number of conditions. Most are based on agglutination reactions between an antigen and a specific antibody.

Antigen is a substance that, when introduced into an individual who does not already possess that substance, may stimulate the individual's cells to produce specific antibodies that react to this substance in some detectable way. The four basic characteristics of an antigen are it must be foreign to the body, it must possess a high molecular weight, it must gain entrance into the body, and it must have a high specificity to stimulate tissues to produce a defensive protein substance called antibody.

Antibodies are the specific defensive proteins produced when an antigen stimulates individual cells. They are produced by the host in response to the presence of an antigen and are capable of reacting with antigens in some detectable way.

The antigen-antibody reaction takes place as a result of a reaction between specific antibodies in the plasma and antigen present on cell surfaces.

RAPID PLASMA REAGIN (RPR) CARD TEST FOR SYPHILIS

The RPR testis a sensitive, easily done screening test for syphilis. It is performed on unheated plasma or serum. Everything needed for the testis in a kit that is available commercially. This is very useful aboard ship and at small stations not equipped to do the VDRL.

Principle of the Test

The RPR test is a nontreponemal testing procedure for the serologic detection of syphilis. The RPR card antigen suspension is a carbon-particle cardiolipin antigen that detects reagin, an antibodylike substance present in the sera from syphilitic persons and occasionally in sera of persons with other acute or chronic conditions. When a specimen contains antibody, flocculation occurs with a coagglutination of the carbon particles of the RPR card antigen, which appear as black clumps against the white background of the plastic-coated card. Nonreactive specimens appear to have an even light-gray color.

Reagents

1. RPR Card Test Antigen
   a. The antigen consists of cardiolipin, lecithin, cholesterol, EDTA, Na_2HPO_4, KH_2PO_4, charcoal, choline chloride (10 percent), distilled water, and the preservative thimerosal (0.1 percent) (supplied in kit).
   b. Store unopened vials at 4°C. Stable to expiration date.
   c. Store "in-use" antigen suspension in dispensing bottle at 4°C. Stable for about 3 months, or until expiration date if it occurs sooner.
   d. Record antigen lot number and expiration date on dispensing bottle.
2. RPR Card Test Control Cards
   a. The card consists of three labeled test areas containing lyophilized specimens with designated patterns of reactivity: Reactive, Reactive-Minimal-to-Moderate, and Non-reactive.
   b. Store unopened foil-sealed envelopes at 4°C. Stable to expiration date.
   c. Not supplied with the kit and must be purchased separately.

Equipment

1. Needle
   a. Supplied in kit
   b. Adjusted to deliver 60 drops, plus or minus 2 drops, per milliliter of antigen.
2. Dispensing Bottle
   a. Supplied in kit
   b. Used to store in-use antigen
3. Rotator—Adjusted to 100 r.p.m.
4. Dispenstir
   a. Supplied in kit
   b. Manufactured to dispense 0.05 ml of serum
5. Diagnostic Cards
   a. Supplied in kit
   b. Plastic-coated cards, with 10 rings, for testing patient specimens.

Preliminary Preparation for Testing

1. Remove antigen suspension vial and one control card envelope from the refrigerator. Allow to adjust to room temperature.

2. Resuspend contents of vial by vigorously shaking the antigen vial.

3. Snap the neck of the vial.

4. Attach the needle (provided in the kit) to a 1 milliliter tuberculin syringe. Slowly draw up into the syringe approximately 1 milliliter of the antigen suspension from the vial.

5. Hold the syringe perpendicular to the surface, and count the number of drops dispensed from a 0.5 ml volume. Allow the drops to fall into the antigen vial. The needle is accurate if 30 drops, plus or minus 1 drop, are dispensed from the 0.5 ml volume.

6. Slowly expel the remainder of antigens in the syringe back into the antigen vial.

7. Remove the needle from the syringe; place the needle on the tapered fitting of the plastic dispensing bottle (provided in kit).

8. Slowly withdraw all contents of the antigen vial by collapsing the dispensing bottle and using it as a suction device.

9. Allow the rotator to warm up for 5 to 10 minutes; adjust to 100 r.p.m.

Test Procedure

1. Open foil package and remove control card.

2. Reconstitute each control card circle with 0.5 ml of distilled water by use of a dispenstir.

3. Using the broad end of the dispenstir, mix until the dehydrated control specimen is dissolved. Spread specimen over entire area of circle. Use a separate dispenstir for each circle.

4. To draw the patient's sample, hold the dispenstir between the thumb and forefinger near stirring or sealed end and squeeze; do not release pressure until the open end is below the surface of the specimen. Release finger pressure to draw up the sample.

5. Hold the dispenstir in a vertical position, directly over the card test area to which the specimen is to be delivered; squeeze dispenstir, allowing 1 drop to fall onto the test area.

6. Invert the dispenstir, and, with the sealed end, spread specimen within the confines of the circle. Discard the dispenstir.

7. Continue the above steps until one or two test cards are filled with patient's samples.

8. Gently shake the antigen dispensing bottle before use. Hold in the vertical position and dispense several drops into the dispensing bottle cap to ensure that the needle passage is clear. Allow 1 "free-falling" drop to fall onto each test area. Do not stir; mixing of antigen suspension and specimen is accomplished during rotation.

9. Put card(s) on rotator and cover with humidifying cover.

10. Rotate for 8 minutes at 100 r.p.m. Following rotation, to help differentiate Nonreactive from Reactive results, a brief rotating and tilting of card by hand (3 to 4 to-and-fro motions) must be made.

11. Then immediately read Card microscopically in the "wet" state and under the high-intensity lamp.

12. The Reactive control should show characteristic strong clumping; the Nonreactive control should show smooth, grayish appearance of unclumped particles. The Reactive Minimal-to-Moderate control should show minimal-to-moderate clumping. The patients' tests should be compared to the controls for correct interpretations.

13. Report test as:

a. Reactive if specimen shows agglutination or flocculation.

b. Nonreactive if specimen shows no agglutination at the end of 8 minutes rotation.

c. If the RPR test is reactive, an FTA-ABS (Flourescent Treponemal Antibody Absorption Test) must be run on the specimen.

MONOSTICON SLIDE TEST FOR INFECTIOUS MONONUCLEOSIS

The main reason for including this test is that mononucleosis imitates many diseases so well that diagnosis is confirmed only by selective serologic testing.

Principle of the Test

1. Absorption of serum with a suspension of a guinea pig or horse kidney antigen removes antisheep agglutinins in the serum of patients with serum diseases and various infectious diseases.

2. In some serum of patients with infectious mononucleosis, a substantial part of the antibodies remains after absorption.

3. Absorption with a suspension of beef cells removes the antisheep agglutinins in infectious mononucleosis, but leaves them in other infectious diseases.

Rapid slide tests for infectious mononucleosis are based on these principles. Suspensions of guinea pig kidney and beef erythrocyte stomata result in satisfactory instant absorption of antibodies and clear differentiation between infectious mononucleosis and noninfectious mononucleosis sera. Infectious mononucleosis antibodies may be demonstrated as early as the fourth day of illness and practically always by the twenty-first day. Positive results may continue for several months.

Procedure

1. On a clean slide (supplied with kit) place 1 drop of guinea pig antigen, reagent I, into box number 1.

2. Place 1 drop of the beef erythrocyte stomata, reagent II, into box number 2.

3. Add 1 drop of test serum on plasma to both boxes. Mix each with separate sticks.

4. Add 1 drop of horse erythrocyte antigen (supplied with kit) to both boxes. Mix each with separate disposable sticks.

5. Rock slide back and forth for 2 minutes so that liquid flows slowly over the entire area of the boxes.

6. Read results after 2 minutes.

a. Agglutination in box 1 is positive for infectious mononucleosis.

b. Agglutination in box 2 is positive for noninfectious mononucleosis.

c. No agglutination in either box is negative for mononucleosis.

A positive control is included in each kit for the purpose of checking the effectiveness of the reagents.

FUNGUS (PL. FUNGI)

Fungi are heterotrophic, chlorophyll-free, thallophyllic organisms. They reproduce by spores, which germinate into long filaments called hyphae. As the hyphae continue to grow and branch, they develop into a mat of growth called the mycelium (pl. mycelia). From the mycelium, spores are produced in characteristic arrangements. These spores, when dispersed to new substances, germinate and form new growths. Reproduction is often asexual, usually by budding, as in yeast, but certain fungi have sexual reproduction.

Common superficial infections of the skin caused by fungi are athlete's foot and ringworm of the scalp.

POTASSIUM HYDROXIDE (KOH) PREPARATION FOR IDENTIFICATION OF FUNGI

Fungi are seen in clustered round buds with thick walls accompanied by fragments of mycelia. Scrapings from the affected area of the skin are mounted in 10 percent KOH for positive laboratory diagnosis.

Demonstration of the fungi in infected tissue can be accomplished by the following method:

1. Place skin, hair, or nail scrapings from the affected area on a slide and add a drop of 10 percent KOH. Dissolve 10 g of KOH in 100 ml of distilled water.
2. Place a coverslip on the preparation.
3. Warm the preparation gently over a flame, being careful not to boil it, and allow it to stand until clear. Do not allow the preparation to dry out.
4. Read preparation, using a high-power objective with subdued light.
    a. Fungi in the skin and nails appear as refractive fragments of hyphae.
    b. In the hair, fungi appear as dense clouds around the hair stub or as linear rows inside the hair shaft.

BLOOD GROUPING

Blood transfusion, the term used for the process of transferring blood from one person to another, is often a lifesaving remedy, especially in cases of severe hemorrhage, anemia, and infection.

In 1900 Landsteiner discovered the first blood group system that initially comprised groups A, B, and O. Later the AB system was added.

AGGLUTINATION

The work showing that blood can be classified into these four groups was done by random cross matching of the bloods of a large number of people. Two specific antigens (also called agglutinogens) were found on the red cells. These were called A and B. One group of red cells contained no A or B antigen and was called O. A fourth group contained both A and B antigens and was called AB. Antibodies (agglutinins) were found in the serum of blood. These were called anti-A and anti-B antibodies. A person of group A blood (A antigen) has anti-B antibodies (agglutinins) in the serum. A group B individual has anti-A antibodies; a group O individual has both anti-A and anti-B antibodies; and group AB individuals have neither antibody in the serum. With the exception of certain patients with autoimmune diseases, individuals do not have antibodies against their own blood type.

Landsteiner's rule states that when an antigen is on a red blood cell, the corresponding antibody is never present simultaneously. Instead, the reciprocal red cell antigen is present in the plasma or serum. For example, if an individual has blood cells of group A, anti-B antibodies are always present in the serum but never anti-A.

Blood grouping is accomplished by comparing the effects of agglutination by the antibodies on the corresponding antigens within the red cells.

To determine the group to which blood belongs, it is necessary to mix separately a suspension of its red cells with serum of a known group A and a group B that contains agglutinin B and agglutinin A, respectively. The resulting agglutination or absence of agglutination determines the group to which it belongs and is a necessary procedure with the blood of both the donor and the recipient. Only compatible blood is selected for transfusion. One of the four

combinations of reactions shown in the table 7-1 will result.

Rh FACTORS

The most important Rh factor is factor D. Approximately 85 percent of the population is D positive (also called Rh positive), and 15 percent is D negative (also called Rh negative). Aggiutinin for Rh + does not normally occur in the blood. Consequently, Rh + corpuscles do not produce reactions in first transfusions. However, the agglutinogen, when present in large amounts in the blood of recipients, may produce reactions upon transfusion with Rh + corpuscles. Consequently, it is mandatory to select compatible donors whose corpuscles are Rh – for transfusion of Rh – individuals. This is especially important in those who have had previous transfusions (especially with Rh + corpuscles).

TECHNIQUE FOR BLOOD GROUPING AND TYPING

Determination of the A and B agglutinogen is called grouping, while determination of the Rh agglutination is called typing (fig 7-1.) Color-coded Anti-A (blue), and anti-B (yellow), are available through the Navy Supply System.

Blood grouping for the A-B-O system is performed at room temperature. A blood specimen is drawn and allowed to clot. The erythrocytes are resuspended in the serum by mechanical agitation, and single drops are placed on a clean glass slide by a dropper. Colored specific sera are added, and each drop of blood and antiserum are individually mixed with a clean applicator stick. The preparation is observed for agglutination. If agglutination takes place, the red cells gather in clumps. If there is no agglutination, the red cells will be evenly distributed over the field (see fig. 7-1).

The rouleaux formation is another phenomenon that causes trouble in blood typing. It is caused by sera with high globulin content and appears as "red cells stacked up like a pile of coins." Rouleaux formation can easily be confused with true agglutination. CAUTION: Droppers must be used only in their respective sera and cell suspensions to prevent cross-contamination. Applicator sticks used for mixing anti-A and the cell suspension must not be used for mixing anti-B and the cell suspension, and vice versa.

Table 7-1.-Agglutination Reactions of the Red Cells of the Four Blood Groups

International Blood Group	Anti-A	Anti-B
O	–	–
A	+	–
B	–	+
AB	+	+

– Denotes absence of agglutination
+ Denotes presence of agglutination

RESPONSIBILITIES IN THE CLINICAL LABORATORY

As a hospital corpsman, you need to know how to perform the tests discussed in this chapter, especially when you are on duty independent of a medical officer. Although you are not expected to diagnose or treat a patient based on the test findings, you must be able to convey a clear clinical picture to your supporting medical officer to effect prompt, efficient, and professional patient care.

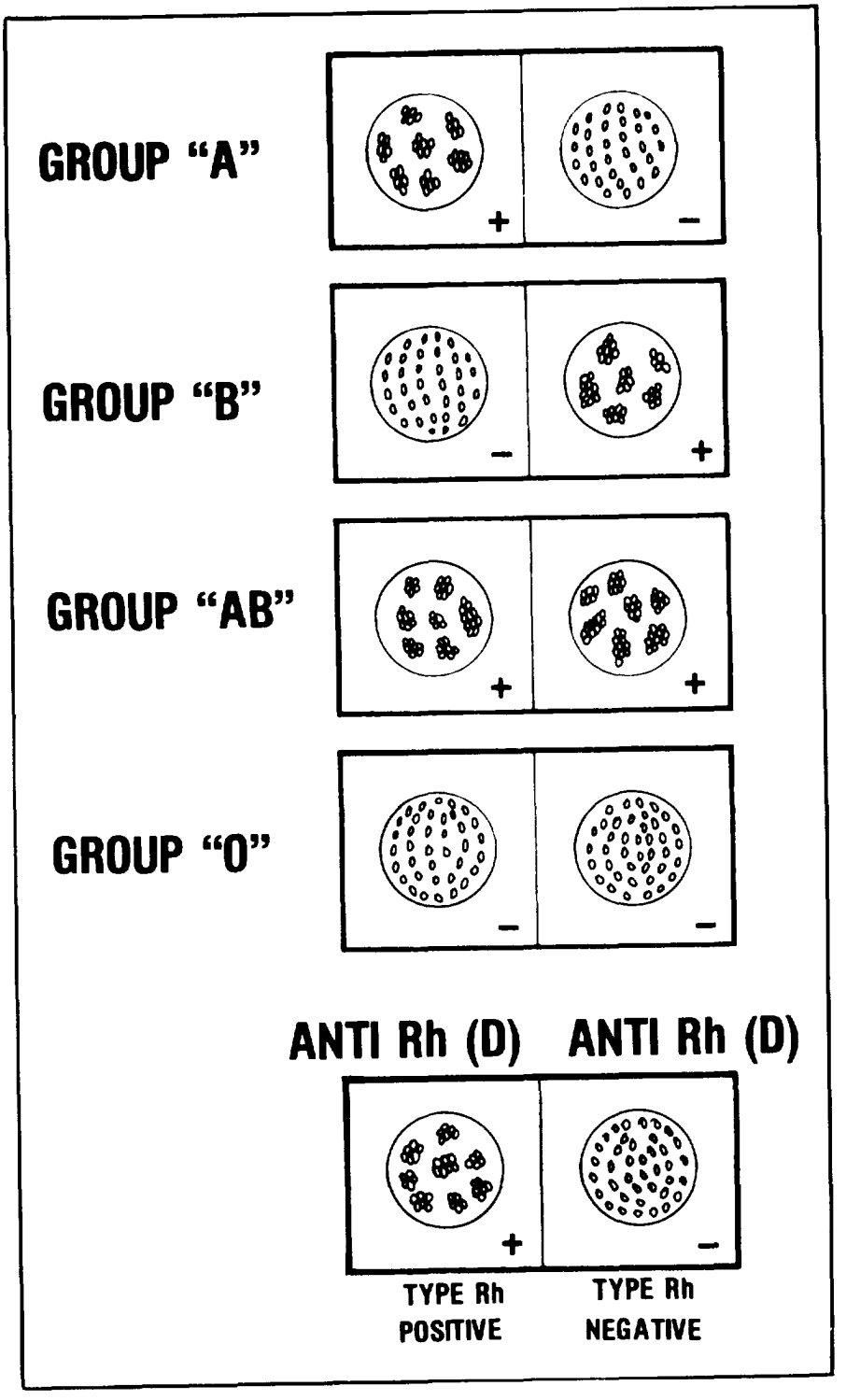
It is very important that the patient, as well as the specimens received, be promptly and properly identified to prevent errors and to minimize future embarrassment and medical complications.

Another important facet of clinical laboratory is the proper use of laboratory forms. Use separate forms for each patient and each type of test. The forms must be filled out completely, accurately, and legibly to ensure expeditious disposition of completed reports. In addition, they must be properly filed and recorded.

In the laboratory you constantly will be dealing with the numerous laboratory forms associated with the tests being performed. These forms when used properly will minimize confusion and reduce chances for errors. For a complete listing of these forms and their purposes, refer to MANMED, chapter 23.

ETHICS IN THE LABORATORY

You are expected to treat all laboratory tests and their results as a confidential matter.



159.26

Figure 7-1.-Blood Grouping and Typing.

Interpretation of the results must be left to the attending physician. Refrain from discussing laboratory results with the patient. It is your ultimate responsibility to safeguard laboratory results from unauthorized access by persons not directly involved. Remember that knowledge of the tests and their results are accessible only to the patient, the attending physician, and you—the performing technician.

REFERENCES:

1. *Technical Manual (AABB),* 8th Edition

2. Lennette, Halows, Hansler, Truant, *Manual of Clinical Microbiology,* 3rd Edition

3. RPR Card Test & Control Cards, Hynson, Wescott & Dunning

4. Monosticon Dri Dot, Organon Diagnostics